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230.01 General

This chapter provides an explanation of and the procedures for WSF Terminal Engineering Quality Control, Quality Assurance and Constructability Reviews. It will explain how the applicable project procedures, practices, and/or plans are to be followed to meet requirements; and identifies the organizational structure of the staff responsible for performing quality activities and verifying compliance. The fact that the Team includes many members from many disciplines reinforces the need for a consistent plan to maintain quality. The quality plan will address quality control procedures for Terminal Engineering including WSDOT staff members, consultant team members, on-call team members, and others involved in the preparation of plans and design documents.

Capital projects with an estimated construction value less than \$100,000 dollars are not required to follow every procedure outlined within this chapter. Formal approval of an exemption from certain steps of the controls outlined in this chapter should be sought from the Design Engineering Manager and documented within the project documentation as outlined in [Chapter 220](#).

230.02 References

(1) Federal/State Laws and Codes

[23 Code of Federal Regulations \(CFR\) 635.411, Material or product selection](#)

[RCW 39.04.155 Small works roster contract procedures — Limited public works process — Definition](#)

[RCW 47.28.030](#), Contracts – State forces – Monetary limits – Small businesses, minority, and women contractors – Rules

[RCW 47.28.035](#), Cost of project, defined

[RCW 47.60.327](#), Operational strategies for asset utilization

[RCW 47.60.365](#), Terminal design standards

RCW 47.60.385, Terminal improvement project funding requests — Predesign study — New vessel acquisition planning

(2) Design Guidance

Office of Financial Management, *2009-11 Transportation Predesign Manual*

[WSDOT Policy Documents Index](#), including those listed below:

- [Executive Order E 1032](#) Project Management
<http://wwwi.wsdot.wa.gov/publications/policies/fulltext/1032.pdf>
- [Secretary's Executive Order 1052](#) Project Risk Management and Risk Based Estimating
- [Instructional Letter 4071.02](#) Risk-Based Project Estimates for Inflation Rates, Market Conditions, and Percentile Selection

WSDOT technical manuals, including those listed below:

🔗 www.wsdot.wa.gov/Publications/Manuals/index.htm

- *Bridge Design Manual LRFD*, M 23-50, WSDOT
- *Bridge Inspection Manual*, M 36-64, WSDOT
- *Bridge List*, M 23-09, WSDOT
- *Cost Estimating Manual for WSDOT Projects*, M 3034, WSDOT
- *Design Manual*, M 22-01, WSDOT
- *Emergency Relief Procedures Manual*, M 3014, WSDOT
- *Environmental Procedures Manual*, M 31-11, WSDOT
- *Geotechnical Design Manual*, M 46-03, WSDOT
- *Highway Runoff Manual*, M 31-16, WSDOT
- *Hydraulics Manual*, M 23-03, WSDOT
- *Local Agency Guidelines*, M 36-63, WSDOT
- *Plans Preparation Manual*, M 22-31, WSDOT
- *Project Control and Reporting Manual*, M 30-26, WSDOT
- *Right of Way Manual*, M 26-01, WSDOT
- *Standard Plans*, M 21-1, WSDOT
- *Transportation Structures Preservation Manual*, M 23-11, WSDOT
- *Utilities Accommodation Policy*, M 22-86, WSDOT
- *Utilities Manual*, M 22-87, WSDOT

WSDOT Administrative manuals, including those listed below:

🔗 www.wsdot.wa.gov/Publications/Manuals/index.htm

- *Advertisement and Award Manual*, M 27-02, WSDOT

- *Electronic Engineering Data Standards*, M 3028, WSDOT

WSDOT Engineering Applications, including those listed below:

🔗 www.wsdot.wa.gov/Design/ProjectDev/EngineeringApplications

- *Bid Tabs*
- *Ebase*
- *Standard Items*
- *Unit Bid Analysis*

Terminal Engineering Intranet Pages, including those listed below:

🔗 www.wsdot.wa.gov/ferries/terminalengineering/default.htm

- *Cost Estimating*
- *Life Cycle Cost Model*
- *Programmatic Scoping*

230.03 Definitions

Checks - Checks are systematic and detailed inspections of project documents to verify they meet specified requirements – i.e. fit for purpose, accuracy, correctness, completeness, etc. Checks are established as a second set of eyes and are performed by a technically qualified individual other than the document's originator. The checking process requires the use of the color coding system. The three basic checks are:

- 100% document check
- Spot check of selected or critical items of a document
- Input/output check for spreadsheets or pre-validated software

Checkprints - Checkprints are copies of original project documents used for the checking process. Marked-up checkprints are to be maintained in the project files for support documentation. (Scanned copies are acceptable.)

Comment Review Form - The Comment Review Form (CRF) is the standard document used to capture and communicate all comments generated from a PS&E or Constructability review process. This form is a MS Excel file. See [Appendix C](#).

DQC Sign-Off Sheet - The Document Quality Control (DQC) Sign-Off Sheet is the cover sheet accompanying all quality review/check documents that contains signatures of all individuals that contributed to the quality process.

Project Documents - A project document is any document or data used during the course of a project up to and including the final deliverable. This includes but is not limited to drawings; specifications; calculations; schedules; estimates; reports; graphics; public communications; Work Orders and Task Orders, documents or data received from other WSDOT departments, outside agencies, or consultants.

Project Engineer – The supervisor of the Project Manager.

Project Management Plan - A formal, approved document that defines how the project is executed, monitored, and controlled. It may be in summary or detailed form and may be composed of one or more subsidiary management plans and other planning documents. For further information, see the [Project Management Online Guide](http://www.wsdot.wa.gov/Projects/ProjectMgmt/Process.htm): ☐
www.wsdot.wa.gov/Projects/ProjectMgmt/Process.htm

Quality - Quality means consistently meeting the needs of the customers and project objectives while developing the full potential of the people contributing to the project delivery.

Quality Assurance - Quality assurance refers to those actions, procedures and methods to be employed at management levels and under the jurisdiction of the Project Engineer to observe and assure that prudent quality control procedures are in place, are being carried out, and that the desired result of quality professional services and construction products are being achieved.

Quality Audit – Quality Audits are performed internally after each Quality Control Review to ensure and document that all QC requirements were performed in accordance to this document. The Quality Manager/Project Manager or designee conducts the audit. Once the audit is passed, a Quality Audit Documentation Form is issued indicating the process was completed. The Quality Audit Documentation Form is shown in [Appendix D](#). Following the Quality Audit, a review package is ready for internal-external or external reviews.

Quality Control - Quality control refers to those actions, procedures, and methods that are to be routinely employed at the production and administrative levels, and under the jurisdiction of the Senior Marine Engineer during the development of work products to produce the desired quality professional services.

Quality Plan - The project plan established by the Project Manager that defines the schedule and scope for all checking and review activities on the project. The Quality Plan is included in the Project Management Plan (PMP).

Reviews - Reviews are intended to assess performance, conduct and/or progress of project documents; verify work is conceptually correct, complete, logical, coordinated, has followed the required procedures, and/or has used the correct requirements; and assess value engineering opportunities. Reviews are established as a second set of eyes and are performed by a technically qualified individual other than the document's originator who may or may not be associated with the project. The types of reviews are:

- Permit Review
- PS&E Review (Interdisciplinary coordination review of PS&E documents during development – i.e. 30%, 60% and 90%)
- Constructability Reviews
- Threshold Review (items supporting project elements, i.e. Risk, CEVP/CRA estimates, VE studies, etc.)
- PS&E Turn-In QA/QC (pre-submittal checklist *prior* to submittal to the Contract Ad and Award office for advertisement and bid opening).

Value Engineering (VE) - Value engineering is defined by the Society of American Value Engineers as the art of developing a plan to maximize value while minimizing cost. It is a systematic, multi-discipline approach designed to optimize the value of each dollar spent. As a management tool, it complements rather than replaces other cost-reduction and/or cost control techniques. The objective is to satisfy the required function at the lowest cost consistent with

performance requirements, reliability, and maintainability. Value engineering has the potential to reduce construction costs if it is performed early during the design phase by experienced staff, and the resulting recommendations are implemented in a timely manner to prevent costly construction delays.

230.04 Roles and Responsibilities

(1) Checks	
Originator (Designer)	<p>The qualified individual responsible for the development of a document in its original form.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Developing project document in accordance with all applicable criteria. • Accuracy, completeness, and correctness, including format, spelling, grammar, mathematical accuracy, etc. of both inputs and outputs before releasing a project document for required Checking. • Identifying and making accessible all input, reference, and backup materials for the Checker's use. • Resolving and incorporating/correcting Checking comments. • Following completion of the original document, signing (not initialing), dating and making a copy of the document (checkprint), adding and completing the DQC sign-off sheet, and issuing the deliverable to the Project Manager, or appropriate individual, for continuation of the quality control process.
Checker (Peer Designer or Supervisor)	<p>The qualified individual assigned to check a project document generated by an Originator. Checkers must have equal or greater experience than the Originator.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Checking the document against: 1) the established inputs and requirements; 2) applicable procedures, standards, and codes; and 3) good practice and judgment. • Color code the document in accordance with the established color code – see Appendix E. • Resolving any significant corrections, additions or deletions that potentially void a portion of the work before continuing with the checking process. Irreconcilable differences between the Originator and Checker must be referred to the Project Manager for resolution. • Initialing the checkprints at the completion of the checking, or signing and dating the DQC sign-off sheet in the space marked "CHECKER" and returning the checkprint(s) to the appropriate individual for continuation of the quality control process.

Project Roles and Responsibilities

Exhibit 230-1

	<p>The Checker must not be unduly influenced by personal opinion about the presentation or approach of the document, nor change it simply to do it his or her way. However, the document must be able to be interpreted by the Checker without further explanation.</p> <ul style="list-style-type: none"> • Coordinating with the Backchecker to resolve any disagreements. Irreconcilable differences shall be referred to the Project Manager and/or discipline Supervisor (Structural or Electrical/Mechanical), as appropriate, for resolution.
Backchecker (Originator)	<p>The qualified individual assigned will verify whether or not the Checking comments are appropriate, and make changes that should be incorporated/corrected in the final project document. Wherever possible the Backchecker should be the Originator.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Reconciling the Checker's comments to the project document. • Changes initiated by the Backchecker are to be made directly on the checkprint in accordance with the color code, and should have full concurrence with the Originator and Checker. • Coordinating with the Checker to resolve any disagreements. Irreconcilable differences shall be referred to the Project Manager and/or discipline Supervisor (Structural or Electrical/Mechanical), as appropriate, for resolution. • At completion of the backcheck, signing and dating the original document and the DQC sign-off sheet in the space marked "BACKCHECKER" and forwarding the project document to the appropriate individual for continuation of the quality control process.
Updater (Originator)	<p>The qualified individual assigned to update the original project document to accommodate reconciled revisions by the Checker and Backchecker. Wherever possible the Updater should be the Originator or should be supervised by the Originator. Wherever practicable the Originator should be notified in advance of any changes to the original project document.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Updating the original project document in accordance with the reconciled checkprints. • Indicating the original has been updated by marking the corrections, additions or deletions of the checkprint in accordance with the color code. • At completion of the update: <ul style="list-style-type: none"> ○ Signing and dating the DQC sign-off sheet or in the space marked "UPDATER". ○ Forwarding the project document to the appropriate individual for continuation of the quality control process.

Project Roles and Responsibilities

Exhibit 230-1 (continued)

Rechecker (Checker)	<p>The qualified individual assigned to verify that corrections have been made to the original project document by the Updater in accordance with the backchecked checkprints. Wherever possible, the Rechecker should be the Checker.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • At the completion of the recheck: <ul style="list-style-type: none"> ○ Sign and date the DQC sign-off sheet in the space marked "RECHECKER" ○ Return the project document to the appropriate individual for continued processing
Project Manager	<p>The qualified individual to make decisions regarding resolution of irreconcilable differences from the checking process in consultation and coordination with applicable discipline supervisors, and how the resulting from the checking process will be incorporated into the project.</p> <p>Responsible for:</p> <ol style="list-style-type: none"> 1. Providing direction for checking documents per the Quality Plan included in the Project Management Plan. 2. Identifying how the project will proceed based on changes from the checking process. 3. Preparing an action plan to address resolution of irreconcilable differences from the checking process. 4. Assembling all QA/QC documentation for the project files.
(2) Reviews	
Originator (Designer)	<p>The qualified individual responsible for the development of a document in its original form.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Developing project document in accordance with all applicable criteria. • Accuracy, completeness, and correctness, including format, spelling, grammar, mathematical accuracy, etc. of both inputs and outputs before releasing a project document for required Review. • Identifying and making accessible all input, reference, and backup materials for the Reviewer's use. • Resolving and incorporating/correcting Review comments. • Following completion of the original document, signing (not initialing), dating and making a copy of the document, adding and completing the DQC sign-off sheet, and issuing the deliverable to the Project Manager, or appropriate individual, for continuation of the quality control process.

Project Roles and Responsibilities

Exhibit 230-1 (continued)

<p>Reviewer(s)</p> <p>(Project Manager;</p> <p>Designers; Construction; Maintenance; Operations;</p> <p>Department Directors)</p>	<p>The qualified individual(s) assigned to review a project document generated by an Originator.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Reviewing the project document(s) to verify; the concept is appropriate and/or the information provided on which other work will be based is conceptually correct; the work is appropriately coordinated with other disciplines; and good practice and judgment are incorporated. • Record review findings using the CRF or memorandum. • Discussing review findings with Originator. • Signing (not initialing) the signing and dating the DQC sign-off sheet in the space marked "REVIEWER" and returning the reviewed document to the appropriate individual for continuation of the quality control process.
<p>Project Manager</p>	<p>The qualified individual to make decisions regarding how the reviews will be incorporated into the project.</p> <p>Responsible for:</p> <ul style="list-style-type: none"> • Providing direction for reviews in the Quality Plan included in the Project Management Plan. • Identifying how the project will proceed based on the review comments. • Preparing an Action Plan to address review findings and recommendations and to indicate compliance or non-compliance along with appropriate explanations. • Assembling all QA/QC documentation for the project files.

Project Roles and Responsibilities

Exhibit 230-1 (continued)

230.05 Project Management Plan

The Project Management Plan defines the project performance baseline—the project deliverables, schedule and budget plans—and the management methods used by the project team to deliver the project. Until a Project Management Plan (PMP) is approved, only 10% of the Preliminary Engineering phase budget will be authorized.

The project performance baseline documents the project team's detailed goals for the performance of the project within the scope, schedule, and budget parameters established by WSF Terminal Engineering.

- **Scope** - the deliverables to be produced by the project team.
- **Schedule** - the logical sequence of work and related milestones.
- **Budget** - the allocation for the project.
- **Risk** – potential risks to the project.

The Project Management Plan includes the [Risk Management](#) , [Change Management](#) , [Communication Management](#) , [Quality Management](#) , and [Transition and Closure](#) plans. These plans help align the team toward uniform goals and describe how the team will:

1. Manage risk events and change,
2. Ensure quality requirements are met,
3. Identify how, when and who will need and receive what project information,
4. Plan for an effective transition or closure.

A Project Management Plan is required for all WSF projects with an estimated construction value greater than \$100,000.

The WSF Terminal Engineering Project Management Plan Template can be found in [Appendix F](#).

230.06 Quality Control

All PS&E documents for contract advertisement and associated calculations, permit documents, and documents to be presented to the public prepared by Terminal Engineering shall be checked (see checking roles and responsibilities in [230.04](#)). **All documents shall be checked with the goal of completing as much checking as possible by or on the 90% review submittal.**

Checking shall be performed by each discipline of its own documents, the timing in accordance with the project's Quality Plan as defined in the PMP. A flow chart of the checking process can be found in [Appendix G](#).

(1) Checking

Checking is comprised of:

- Verifying scope
- Verifying design criteria
- Verifying geometry
- Verifying conformance with Geotechnical criteria
- Verifying conformance with Environmental regulations
- Verifying accuracy of calculations and data
- Verifying accuracy of information conveyed
- Verifying consistency between the calculations and drawings
- Verifying accuracy of Plans and Specifications
- Verifying each item is shown on the Plans
- Verifying each item is described in the Specifications
- Verifying each item is included in summary of quantities
- Verifying each item is accounted for in the project cost estimate
- Verifying the existence and approval of proprietary items (see the Plans Preparation Manual Section 700.05(20) for more information)

- Verifying that, if project has federal funds, Buy America and Buy American requirements have been met (see [Chapter 220](#) for more information)
- Verifying that all State Force Work and State Supplied Material requirements have been met. (see the [Plans Preparation Manual](#) Section 700.05(29) and [RCW 47.28.030](#))

(2) Checking Documentation

All checked documents (checkprints) shall be coded using the standard Quality Control Color Code – See [Appendix E](#). Checked documents shall be accompanied by a copy of the DQC Sign-Off Sheet. The Sign-Off Sheet shall contain signatures and dates of all responsible parties. A template of the DQC Sign-Off Sheet is included in [Appendix H](#).

230.07 Quality Assurance

All Terminal Engineering prepared documents shall receive at least one review. The review shall be performed in accordance with project's Quality Plan as defined in the PMP.

For PS&E, permitting and public communication documents it is imperative that coordination occurs between all the documents and disciplines that are involved to ensure accuracy and consistency of the project's scope.

(1) Review Types

(a) Permit Review

1. Prior to the permit submittal, all documents shall be checked to ensure the project information and scope is adequately reflected, including geotechnical reports and type, size and location determinations. This review is interdisciplinary.
2. During the 90% review or earlier, all documents shall be checked to ensure the PS&E package complies with all relevant laws, agreements, permit conditions and commitments.
3. After checking, an Environmental Commitment Meeting shall be held for each project to discuss the document review as described in 230.07(3) below. This meeting will also ensure the relevant environmental commitments are contained within the specifications, including permits attached as appendices. More on incorporating environmental commitments into WSDOT contracts may be found in [Appendix N](#).

(b) PS&E Review

This is an interdisciplinary review of the Plans, Specifications and Estimate and shall be performed at the 30%, 60%, and 90% submittal phases of the project. This review involves looking at the PS&E documents between and within respective disciplines for interdisciplinary coordination discrepancies at the interfaces, for errors and omissions, and for constructability. These reviews are scalable to the size of the project. If a Project Manager would like to omit any of these reviews, approval from the Design Engineering Manager is required.

1. Deliverables Expectations Matrices

The level of detail and development expected at 30%, 60% and 90% packages vary depending on the type of project. Deliverables Expectations Matrices have been developed to guide the designer and manager to calibrate expectations on what is

required within each set. Detailed requirements within each discipline, presented along the timeline of project development milestones, can be found within each matrix including:

- Purpose
- Decisions required
- Project management expectations
- Environmental
- Tribal outreach
- Geotechnical
- Traffic and Operations
- Civil
- Architectural
- Structural
- Electrical
- Construction

Four different expectation matrices have been developed for use for Terminal Engineering Projects in an attempt to demonstrate components of what may be required within each different project type. The project types are H Span, Wingwall, Dolphin and Toll Booth/Terminal Building Projects. Please see [Appendix I](#).

The Project Manager should choose one of the four that best represents the scope of a particular project and alter to suit.

2. Staff performing reviews

Staff reviewing these packages are as follows (but not limited to):

- Construction Manager
- Construction Support Engineer
- Chief Inspector
- Office Engineer
- Marine Project Engineer(s)
- Maintenance Engineer
- Facility Engineer(s)
- Structural Supervisor
- Maintenance/Electrical Supervisor
- Architect
- Project Controls Estimator
- Plan Reviewer(s)

- Operations Liaison
- Regional Representative (if applicable)

(c) Constructability Reviews

This is a review of the PS&E documents as they compare to the actual site conditions and may optionally be performed on site. The Constructability Review shall be performed at the 60% and 90% submittal phases of a project. Ideally, all discipline designers and the Chief Inspector shall be represented at an on-site meeting to walk through the project site – plans in hand – to identify and discuss coordination issues, gaps, errors and omissions, sequencing and surprises.

At the discretion of the Project Manager, an independent Constructability Review may be performed by an industry professional that focuses on issues from the Contractor's perspective.

(d) Threshold Review

This is a review of a project's supporting elements such as the Risk Worksheet, CEVP, CRA, Value Engineering, etc. This review shall be performed to verify the reasonableness of the element's magnitude and its potential impact to the project. This process and review shall be performed in accordance with [Executive Order E 1053](#) and [Project Delivery Memo 07.01](#).

(e) Estimate

The 90% and earlier estimates will be submitted to Project Controls for the Lead Estimator to review and comment prior to finalization in EBASE. Included within that submittal will be backup documentation that includes the basis of unit bit prices and Lump Sum item back up calculations. For the 90% estimate, when applicable, the Project Manager will request the CADD team or the designers to review quantities.

(f) PS&E Turn-In QA/QC

The Project Status Report (PSR) is produced weekly for all projects that will be advertised in the next 90 days and projects that are currently being advertised. All the checkboxes on the report must be cleared before a project is allowed to be advertised by the WSDOT Contract Ad and Award Office in Olympia. The Project Status Report includes the following:

- Ad Date, Award Date and Addendum Deadline Date
- Status of Design and Project Development (Design Documentation Package) Approval
- Contract Working Days
- Engineer's Estimate Dollar Range
- Number of Plan Sheets
- List of all Applicable Permits and Agreements
- Utility Conflicts and Relocations Status
- Existence of Federal Funds and Federal Contract Provisions required by funding source (typically DHS, FHWA or FTA)

- NEPA/SEPA Status
- Special Provision Approval Status
- Funds Request and Work Order Approval Status
- Proprietary Item Issues and Approvals
- Right-Of-Way Certification Status
- MWBE/DBE/Training Goals Request and Determination Status

Note that some of the above may not be applicable to a particular project.

A copy of the Project Status Report can be found in [Appendix J](#). A copy of the PS&E Turn-In QA/QC process can be found in [Appendix K](#).

(2) Review Documentation

Reviewers shall utilize the discipline specific review checklists as a guide for the review process. This ensures a comprehensive check of all documents and project aspects through the course of the multiple review process. The checklists assist in review direction to verify similar elements and potential gaps within other disciplines.

Checklist templates are included in [Appendix L](#). Electronic copies of the checklist templates are found at: [G:\Proj\Z-PM_Standards\QAQC\A-QAQC Template](#). Templates may be modified to suit project specific requirements.

Reviewed documents shall be accompanied by a copy of the DQC Sign-Off Sheet. The Sign-Off Sheet shall contain signatures and dates of all responsible parties.

PS&E and Constructability reviews shall utilize the Comment Review Form (CRF) to capture and organize all generated comments and associated responses. A review meeting shall be held to discuss and resolve outstanding issues that involve more than one discipline.

Review documentation for a project's risk based elements (CEVP, CRA, etc.) consist of development and implementation of the project's Risk Management and Change Management plans, in accordance with [Executive Order E 1053.01](#) and [Project Delivery Memo 07.01](#). A copy of Executive Order E 1053.00 can be found at <http://www.wsdot.wa.gov/publications/fulltext/cevp/1053policy.pdf>. A Risk Management Plan template can be found on the WSDOT Project Management Online Guide webpage: http://www.wsdot.wa.gov/Projects/ProjectMgmt/OnLine_Guide/Tools/Risk_Management_Plan.xls

Note that this template is for projects that do not meet the requirements for a CRA and CEVP workshop. For CRA or CEVP risk plans contact the Strategic Analysis and Estimating Office.

(3) Review Meetings

Review meetings shall be scheduled so that the design team and reviewers can discuss, coordinate and resolve outstanding issues resulting from a review. The intent of the review meeting is to discuss only outstanding issues that impact more than one discipline or issues that can be resolved between designers and reviewers, not perform a line-by-line review of each comment. Resolution shall be recorded on the CRF.

The review meeting shall be scheduled after all comments have been consolidated and distributed to the designers, and the designers have had a period of time to review the comments.

(4) Comment Review Form

The Comment Review Form (CRF) shall be distributed to all reviewers for PS&E and Constructability reviews. The form shall be filled out by each reviewer to capture comments. All comments shall be consolidated by the project manager to one master form for each review, i.e. 30%, 60%, 90%. The master form shall be distributed by the project manager to all designers for their reply to comments. All replies shall be consolidated by the project manager to the master form and distributed to the reviewers. The reviewers shall verify all comments were addressed during subsequent submittal reviews.

If comments/responses are not incorporated into the documents (plans/specifications/estimate) as described, the reviewer shall elevate the issue to the Project Manager.

A copy of the CRF is included in [Appendix C](#). An electronic copy of the CRF template is included at this [link](#).

The electronic master CRF developed for each review shall be saved in the project's design folder under: **\\Design\D600 Review\611 Comments**.

(5) DQC Quality Audit

The Project Manager shall audit the project files to ensure the checking and reviewing procedures were followed through the course of the project. The Project Manager shall demonstrate the completion of the Quality Audit by completing and signing the Quality Audit Sign-Off Sheet. A copy of Quality Audit Sign-Off Sheet is included in [Appendix D](#).

DQC Sign-Off Sheets, checkprints, Comment Review Forms and all other quality checking and review documents shall be included in the Design Project File and archived.

230.08 Quality Control / Quality Assurance (Consultant Designed Projects)

(a) Consultant PS&E-Projects on WSF Right-of-Way

PS&E prepared by consultants will follow a similar QC/QA procedure as found in 230.06 and 230.07 for WSF prepared PS&E's, and, as a minimum, shall include the following elements:

1. WSF Project Manager's Responsibilities

- Review Scope of Work.
- Negotiate contract and consultant's Task Assignments.
- Coordinate/Negotiate changes to Scope of Work.

2. WSF Design Reviewer's Responsibilities

- Initiate a project start-up meeting with the Consultant to discuss design criteria, submittal schedule and expectations, and also to familiarize himself/herself with the Consultant's designers.
- Early in the project, review consultant's design criteria, and standard details for consistency with WSDOT/WSF practices and other designs in the project.

- Review and concur with consultant prepared material in support of and obtain Design Approval and Project Development Approval from WSDOT Assistant State Design Engineer Assigned to WSF.
- Review and concur with consultant prepared deviations from WSF Terminal Design Criteria. The Reviewer will then obtain approval from WSDOT Assistant State Design Engineer assigned to WSF.
- Obtain approval for the use of proprietary items in the project. Check for the use of proprietary items in the following locations:
 - Plan Sheets
 - Estimates (Summary of Quantities)
 - Special Provisions

See Division 7 of the Plans Preparation Manual for more information regarding proprietary items. Please note that, absent proprietary item use request approval, listing a single product followed by the phrase “or approved equal” is not allowed. Current WSDOT blanket approvals may be found at the following location:

<http://www.wsdot.wa.gov/Design/ProjectDev/BlanketApprovals.htm>.

- Adding variances into the [Design Variance Inventory System Database](#).
- After Design Approval and again after Project Development Approval have been granted; review the project file for consistency and completeness.
- Identify resources needed to complete work.
- Reach agreement early in the design process regarding structural concepts and design methods to be used
- Identify who is responsible for specific tasks or deliverables and when all intermediate constructability, Plans, and PS&E review submittals are to be made
- Monitor progress
- Facilitate communication, including face-to-face meetings with consultants and/or other WSF Disciplines
- Verify that the Consultant’s design has been checked by the Consultant’s checker at the 100% submittal. The checker’s calculations should be included in the designer’s calculations set.
- Review Consultant’s design calculations and plans for completeness and conformance to WSF design practice. The plans shall be checked for constructability, consistency, clarity, and compliance. Also, selectively check dimensions and elevations.
- Review Plans, Special Provisions, and Estimate, including the EBASE File.
- Resolve differences
- Review and submit updates for the Project Status Report

230.09 Quality Control / Quality Assurance (Structures)

(1) General

The purpose of the QC/QA procedure is to improve the quality of the structural designs and plans. The key element to the success of the process is effective communication between all Disciplines and stakeholders.

The goals of the QC/QA procedure are:

- Designed structures that improve public safety and meet state regulations
- Designed structures which meet the requirements of :
 - Structural Design Criteria established in this Terminal Engineering Design Manual
 - The WSDOT Bridge Design Manual
 - AASHTO LRFD Bridge Design Specifications
 - Current structural engineering practices
- Designed structures that are aesthetically pleasing, constructible, durable, economical, inspectable, and require little maintenance.
- Design contract documents that meet the customer's needs, schedule, budget and construction staging requirements.
- Structural design costs are minimized.
- An organized and indexed set of design calculations for the Project File. Design criteria and assumptions are included in the front after the index.
- Plan quality is maximized.
- The QA/QC procedure allows for change, innovation, and continuous improvement.
- The goals are listed in order of importance. If there is a conflict between goals, the more important goal takes precedence.

The Supervisor determines project assignments and the QC/QA process to be used in preparation of the structural design. The intent of the QC/QA process is to facilitate plan production efficiency and cost-effectiveness while assuring the structural integrity of the design and maximizing the quality of the structural contract documents.

The WSF Structures Group QC/QA procedure is a component of the general WSDOT template for project management process.

(2) Design/Check Procedures

(a) PS&E Prepared by WSF

1. Design Team

The design team usually consists of the Designer(s), Checker(s), and Structural Detailer(s) who are responsible for preparing a set of contract documents on or before the scheduled due date(s) and within the budget allocated for the project.

The QC/QA procedures may vary depending on the type and complexity of the structure being designed, and the experience level of the design team members. More supervision,

review, and checking may be required when the design team members are less experienced. In general, it is a good practice to have some experienced designers on every design team.

All design members should have the opportunity to provide input to maximize the quality of the design plans.

2. Designer Responsibility

The designer is responsible for the content of the contract plan sheets, including structural analysis, completeness and correctness.

During the design phase of a project, the Designer will need to communicate frequently with the Supervisor, other disciplines and other Stakeholders, such as operations. This includes acquiring, finalizing or revising roadway geometrics, soil reports, and hydraulic recommendations, mechanical and electrical requirements. Constructability issues may also require that the Designer communicate with the Construction Group. The Designer may have to organize face-to-face meetings to resolve constructability issues early in the design phase.

The Designer shall advise the supervisor as soon as possible of any scope and project cost increases and the reasons for the increase. The Supervisor will then notify the Project Manager if the delivery schedule will have to be changed. The Project Manager is responsible for communicating and obtaining necessary approvals from management.

The Designer is responsible for project planning which involves the following:

- Determine scope of work, identify tasks and plan order of work.
- Prepare design criteria that are included in the front of the design calculations. Compares tasks with WSF office practice and AASHTO bridge design specifications.
- Prepare justification for deviation from WSF Terminal Design Standards, [WSDOT Bridge Design Manual](#) standards, or AASHTO standards
- Prepare materials and seek ASDE Project Design Approval and Project Design Approval as described in [Chapter 220](#).
- Prepare justification for the use of proprietary items in the contract
- Prepare justification for the use of state force work on the project
- Meet with the Project Manager and other project Stakeholders early and as often as necessary in the design process to resolve as many issues as possible before proceeding with final design and detailing.
- Identify coordination needs with other Designers, Permit Coordinators and the Project Manager.
- Early in the project the structure sheet numbering system should be coordinated with the CADD Group and the Project Manager.
- At least monthly or as directed by the Design Supervisor:
 - Update Project Schedule and List of Sheets
 - Estimate percent complete
 - Estimate time to complete
 - Work with the Supervisor to adjust resources, if necessary.
- Develop preliminary quantities for all cost estimates after the Preliminary Plan stage.

- Near end of project, the designer shall:
 - Develop quantities
 - Coordinate all final changes, including review comments received
 - Meet with WSF staff and other project stakeholders at the constructability review/round table review meetings to address final project coordination issues.
 - The designer should inform the Supervisor of any areas of the design, which should receive special attention during checking and review.
 - Prepare the QA/QC Checklist, and obtain signatures/initials as required. This applies to all projects regardless of type or importance.

The design calculations are prepared by the designer and become a very important record document. Design calculations will be a reference document during the construction of the structure and throughout the life of the structure. It is critical that the design calculations be user friendly. The design calculations shall be well organized, clear, properly referenced, and include numbered pages along with a table of contents. See Section (3) Design/Check Calculation File for directions in organizing the calculations.

The design calculations shall be archived in the Project File. Computer files should be archived for use during construction, in the event that changed conditions arise. Archive-ready design and check calculations shall be bound and submitted to the Supervisor concurrently with the turn-in of the 100% PS&E Submittal. Calculations shall be available for reference within the WSF Structures Group until completion of construction. After construction they shall be sent to the WSF Terminal Engineering Library to be cataloged into the WSF library.

The Designer is responsible for resolving construction problems referred to the Structures Group during the life of the contract.

3. Checker Responsibility

The Checker is responsible to the Supervisor for “quality assurance” of the structural design, which includes checking the design, plans and specifications to assure accuracy and constructability. The Supervisor works with the Checker to establish the level of checking required. The checking procedures for assuring the quality of the design will vary from project to project. Following are some general checking guidelines:

a. Design Calculations

Design Calculations may be checked by either of two methods:

- Design calculations may be checked with a line by line review and initialing by the checker. If it is more efficient, the checker may choose to perform his/her own independent calculations.
- Iterative design methods may be best checked by review of the designer’s calculations, while standard and straight-forward designs may be most efficiently checked with independent calculations. All the Designer and Checker calculations shall be placed in one design set.

Revision of design calculations, if required, is the responsibility of the designer.

b. Structural Plans

The Checker's plan review comments are recorded, following the requirements of the Quality Assurance section above, on a copy of the structural plans, including details and bar lists, and returned to the Designer for consideration. These check prints are a vital part of the checking process, and shall be preserved. If the Checker's comments are not incorporated, the Designer should provide justification for not doing so. If there is a difference of opinion that cannot be resolved between the Designer and Checker the Supervisor shall resolve any issue. Check prints shall be submitted to the Supervisor at the time of 90% and 100% PS&E turn-in.

If assigned by the Supervisor, a Structural Detailer shall perform a complete check of the geometry using CADD or hand calculations.

Revision of plans, if required, is the responsibility of the Designer.

c. Quantities and Bar List

The checker shall check the bar list. The Checker shall provide an independent set of quantity calculations. These together with the Designer's quantity calculations shall be placed in the project file.

Resolution of differences between the Designer and Checker shall be completed before the PS&E submittal.

d. Additional Checking Responsibilities

- Perform a structural/constructability review of the plans.
- Review and concur with Structure Preliminary Design.
- Review unique project special provisions and Standard Specification modifications relating to structures. Verify the Standard Specification supplemented by the Special Provisions completely address the required work.

4. Structural Drafter Responsibility

The Structural Drafter is responsible for the quality and consistency of the contract plan sheets. The Structural Drafter shall ensure that the CADD drafting standards are upheld and will:

- Ensure CADD Standards are per WSF CADD Standards
- Provide necessary and adequate information to ensure the contract plans are accurate, complete, readable and constructible
- Detail plan sheets in a consistent manner and follow accepted detailing practices
- Check plans for geometry, reinforcing steel congestion, consistency, and verify control dimensions
- Check for proper grammar and spelling
- Maintain an ongoing understanding of bridge construction techniques and practices

5. General Structures Plan Stamping and Signature Policy

This policy applies to plans produced by both WSF personnel and consultants. The stamping and signing of Structures Plans is the final step in the QC/QA procedure. It

signifies a review of the plans and details by those in responsible charge of the Structure Plans. At least one licensed structural engineer shall stamp and sign each contract plan sheet. (Except berthing structures do not require a licensed Structural Engineer, only a licensed PE who is knowledgeable in the design of structures.)

For contract plans prepared by WSF structural engineering staff by a licensed Civil or licensed Structural Engineer, the Structures Supervisor and the licensed Civil or licensed Structural Engineer co-seal and sign the plans.

For contract plans prepared by consultant, the consultant principal and the licensed Civil or licensed Structural Engineer co-seal and sign the plans.

The contract plans not prepared by a licensed Civil or licensed Structural Engineer, the Structures Supervisor who is a licensed Structural Engineer shall stamp those plans.

(3) Design/Check Calculation File

(a) File of Calculations

- The WSF Structures Office maintains a file of all pertinent design/check calculations for documentation and future reference.

(b) Procedures

- After an assigned project is completed and the structure is built, the designer shall turn in a bound file containing the design/check calculations for archiving. The front cover should have a label identifying the project date, contract number, PS&E number, project name and structure designation(s).

(c) File Inclusions

The following items should be included in the file:

1. Index Sheets

- Number all calculation sheets and prepare an index by subject with the corresponding sheet numbers.
- List the name of the project, charge number, designer/checker initials, date (month, day and year), and Supervisor's initials.

2. Design Calculations

- The design calculations should include design criteria, design assumptions, loadings, structural analysis, one set of moment and shear diagrams, and pertinent computer input and output data (reduced to 8½" x 11" sheet size).
- The design criteria, design assumptions, and special design features should follow in that order behind the index.
- Construction Estimate Calculations

3. Special Design Features

- Brief narrative of major design decisions or revisions and the reasons for them.

4. Construction Problems or Revisions

- Not all construction problems can be anticipated during the design of the structure; therefore, construction problems arise during construction, which will require revisions. Calculations for revisions made during construction should be included in the design/check calculation file when construction is completed.

(d) File Exclusions

The following items should not be included in the file:

1. Geometric calculations
2. Irrelevant computer information
3. Prints of Office Standard Sheets
4. Irrelevant sketches
5. Voided sheets
6. Preliminary design calculations and drawings unless used in the final design
7. Test hole logs
8. Quantity calculations

230.10 Project Goal Requirements

Four weeks prior to AD, voluntary Minority/Minority Business Enterprise (MWBE) goals for state funded projects, or mandatory Disadvantaged Business Enterprise (DBE) and Training Goals are requested from the WSDOT Headquarters Office of Equal Opportunity. The Project Manager is responsible for this request, which includes a form for [MWBE](#) or [DBE](#) Goals, 90% Estimate in the form of the Ebase Summary and Item Reports, and a copy of the 90% special provisions. This requirement does not apply to projects with an Engineer's Estimate less than \$100,000. However, for purposes of record keeping and reporting, all projects shall submit a goals request.

The criteria for Project Goals Requirements are as follows:

Funding Type		Criteria	Goal Requirements
State Only		>\$100,000 engineer's estimate	voluntary MWBE goals inserted in GSP
Federal Only	FHWA	>\$100,000 engineer's estimate	require DBE goals
		>=50 working days	require OJT goals
	FTA	>\$100,000 engineer's estimate	actual DBE goal = 0, with voluntary goal inserted in GSP
State & Federal		use only federal criteria	use only federal goal requirements

Project Goals Requirements

Exhibit 230-1

230.11 Advertisement

All Project Managers must follow the AD Process when preparing to submit a package for Advertisement. The document containing this template can be found in [Appendix M](#).

The Director of Terminal Engineering approves the decision to advertise any project within Terminal Engineering.

No project may be Advertised without Project Development Approval or with any outstanding proprietary item or cultural resource issues.

(1) Approval Process for Project Specific Special Provisions

In the [Plans Preparation Manual, Section 630, Project Specific Provisions](#), states:

“Approval of project specific specifications that alter Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT Spec book) is required prior to inclusion in your contract. All project specific specifications are to be sent, along with justification, to the State Construction Engineer for concurrence and approval.”

In conjunction with the above guidance, below is the process for approval of all project specific special provisions. This applies to any and all special provisions that supplement or revise the current edition of the WSDOT Standard Specifications, make changes to State-wide or WSF General Special Provisions (GSPs), or are created as stand-alone special provisions.

(a) Provision Approval Process

The process below is sequential, requiring resolution and approval at each step before proceeding to the next.

1. The designer shall coordinate with the PS&E reviewers for content and format correctness in the writing of project specific provisions and revisions to GSPs.
2. The designer shall then send the special provision, depending on the discipline to which it is related, to the Marine Project Engineer, Structural Supervisor or the Electrical Supervisor for approval.
3. The designer will then send the PE/Supervisor approved special provision to both the Design Engineering Manager and the Construction Manager for review and approval.
4. A minimum of two weeks prior to Ad, following approval by the Managers, the entire special provisions document shall be submitted to the Assistant State Construction Engineer (ASCE) assigned to WSF for final review and final approval. The purpose of this final review is to ensure uniformity with WSDOT contracting practices, policies and philosophies. The following exceptions should be noted:
 - For Division 1 General Requirements, Sections 1-02, 1-03, and 1-08 require approval by the ASCE. Other Sections of Division 1 require WSF Design Engineering Manager approval only.
 - Architectural project specific special or technical provisions require approval by the WSDOT Equipment and Facilities Office Project Delivery Manager or designee.

(2) General

The Project Manager is responsible for formatting and moving the special provisions through the approval process in a timely manner. A copy of each approval and each associated special provision shall be placed in the project file folders.

Subject to approval of the WSF Design Engineering Manager, an approved project specific special, used on a previous project may not require WSDOT Headquarters approval identified above.

All project specific special provisions require approval at the WSF Manager level prior to submitting the final approval request to Headquarters.

Final Approvals are required before going to Ad.

When submitting for Final Approval of special provisions, please ensure that they are understood in context for the project as a whole. This will help the final approving authority respond in a more efficient, informed, and timely manner.

- Provide the names of the PE's and Managers who have reviewed and approved the special provision.
- Include background information as to why you are proposing a new special provision or modifying an existing special provision.
- Submit the entire compiled project special provisions and Table of Contents with project specific files highlighted for easier visual reference.

(3) Advertisement Duration

The minimum duration time a project is advertised through the WSDOT Headquarters Ad and Award Office is as follows:

<u>Engineer's Estimate</u>	<u>Duration</u>
< \$50,000 (State Funds)	2 weeks
< \$50,000 (Federal Funds)	3 weeks
\$50,000 – \$1,000,000	3 weeks
\$1,000,000 – \$3,000,000	4 weeks
> \$3,000,000	6 weeks

Excluding holiday weeks, the Advertisement (Ad) Date is always on a Monday and the Bid Opening Date is always on a Wednesday. The final PS&E package is due in WSDOT Headquarters Ad and Award Office by noon on the Wednesday preceding the Ad Date.

230.12 Limited Public Works Contracts

State funded projects with an engineer's estimate below \$35,000 may be advertised as Limited Public Works projects, subject to the approval of the Director of Terminal Engineering.

Per RCW 39.04.155, the breaking of any project into units, or accomplishing any projects by phases, is prohibited if it is done for the purpose of avoiding the maximum dollar amount of a contract that may be let using the small works roster process or limited public works process.

These projects are not advertised through the typical HQ Ad and Award process. The process for preparing a Limited Public Work contract includes the following:

- At the time of the request for the construction work order is submitted for approval, the project manager will contact HQ Ad and Award office and request a list of bidders.
- The project manager will notify WSF Contracts and Legal Services Office and request an internal project number which will serve as the contract number.
- After the above steps have been satisfactorily completed, and the work order approved, the Terminal Engineering Construction Office will solicit bids via fax. Ad duration is typically one week.
- Upon completion of the work order the Terminal Engineering Construction Office can proceed with the solicitation of bids from the list of bidders via fax.